CLAIMS

1. A method for manufacturing a magnetic recording medium, comprising the steps of:

laminating a non-magnetic under-layer on a non-magnetic substrate by sputtering in an atmosphere having a partial pressure of H_2O of 2×10^{-10} Torr or below;

laminating a non-magnetic intermediate layer on said non-magnetic under-layer by sputtering in an atmosphere having a partial pressure of H_2O of 2×10^{-10} Torr or below;

laminating a magnetic layer on said intermediate layer by sputtering in an atmosphere having a partial pressure of H_2O of 2×10^{-10} Torr or below;

the step of lamination a magnetic layer including laminating to form at least ferromagnetic grains and grain boundaries surrounding said grains;

laminating a protective layer on said magnetic layer, and

laminating a liquid lubricant layer on said protective layer.

2. A method, according to claim 1, wherein:

said non-magnetic intermediate layer is made of at least a metal selected from the group consisting of Ti, Cr, Zr, Hf, Ti alloy, Cr alloy, Zr alloy and Hf alloy; and

said non-magnetic intermediate layer has a hexagonal close-packed crystal structure.

3. A method, according to claim 1, wherein:

said non-magnetic intermediate layer has a thickness of from 0.5 nm to 20 nm.

4. A method, according to claim 1, wherein:

said non-magnetic grain boundary is composed of at least one of an oxide and a nitride of at least one element selected from the group consisting of Mg, Al, Si, Ti, Cr, Mn, Co, Zr, Ta, W and Hf.

5. A method, according to claim 1, wherein:

said under-layer is composed of at least one of chromium and a chromium alloy.

6. A method, according to claim 1, wherein:

said non-magnetic substrate is composed of a material selected from the group consisting of a crystallized glass, a chemically strengthened glass and a plastic.

7. A method, according to claim 1, wherein:

said steps of laminating said non-magnetic under-layer, laminating said non-magnetic intermediate layer, laminating said magnetic layer, said step of laminating said protective layer, and said step of laminating said liquid lubricant layer include omitting heating during the performance of these steps.

8. A magnetic recording medium, manufactured by a method according to claim 1.

9. A method for manufacturing a magnetic recording medium, comprising the steps of:

laminating a non-magnetic under-layer on a non-magnetic substrate by sputtering in an atmosphere having a partial pressure of H_2O of 2×10^{-10} Torr or below;

laminating a non-magnetic intermediate layer on said non-magnetic under-layer by sputtering in an atmosphere having a partial pressure of H_2O of 2×10^{-10} Torr or below, said non-magnetic intermediate layer made of at least a metal selected from the group consisting of Ti, Cr, Zr, Hf, Ti alloy, Cr alloy, Zr alloy and Hf alloy; said

non-magnetic intermediate layer having a hexagonal close-packed crystal structure, and said non-magnetic intermediate layer having a thickness of from 0.5 nm to 20 nm;

laminating a magnetic layer on said intermediate layer by sputtering in an atmosphere having a partial pressure of H_2O of 2×10^{-10} Torr or below, said magnetic layer comprising at least ferromagnetic grains and grain boundaries surrounding said grains,

laminating a protective layer on said magnetic layer, and

laminating a liquid lubricant layer on said protective layer.

10. A magnetic recording medium manufactured by a method according to claim 9.

11. A method for manufacturing a magnetic recording medium, comprising the steps of:

selecting a non-magnetic substrate;

laminating a non-magnetic under-layer on a non-magnetic substrate by sputtering in an atmosphere having a partial pressure of H_2O of 2×10^{-10} Torr or below;

laminating a non-magnetic intermediate layer on said non-magnetic under-layer by sputtering in an atmosphere having a partial pressure of H_2O of 2×10^{-10} Torr or below, said non-magnetic intermediate layer made of at least a metal selected from the group consisting of Ti, Cr, Zr, Hf, Ti alloy, Cr alloy, Zr alloy and Hf alloy; said non-magnetic intermediate layer having a hexagonal close-packed crystal structure, and said non-magnetic intermediate layer having a thickness of from 0.5 nm to 20 nm;

laminating a magnetic layer on said intermediate layer by sputtering in an atmosphere having a partial pressure of H_2O of 2×10^{-10} Torr or below, said magnetic layer comprising at least ferromagnetic grains and grain boundaries surrounding said grains,

laminating a protective layer on said magnetic layer,

laminating a liquid lubricant layer on said protective layer; and

conducting said steps of laminating without a step of heating.

12. A magnetic recording medium manufactured by a method according to claim 11.

13. A method for manufacturing a magnetic recording medium, comprising the steps of:

selecting a non-magnetic substrate;

laminating a non-magnetic under-layer on a non-magnetic substrate by sputtering in an atmosphere having a partial pressure of H_2O of 2×10^{-10} Torr or below;

laminating a non-magnetic intermediate layer on said non-magnetic under-layer by sputtering in an atmosphere having a partial pressure of H_2O of 2×10^{-10} Torr or below, said non-magnetic intermediate layer made of at least a metal selected from the group consisting of Ti, Cr, Zr, Hf, Ti alloy, Cr alloy, Zr alloy and Hf alloy; said non-magnetic intermediate layer having a hexagonal close-packed crystal structure, and said non-magnetic intermediate layer having a thickness of from 0.5 nm to 20 nm;

laminating a magnetic layer on said intermediate layer by sputtering in an atmosphere having a partial pressure of H_2O of 2×10^{-10} Torr or below, said magnetic layer comprising at least ferromagnetic grains and non-magnetic grain boundaries surrounding said grains, said non-magnetic grain boundaries being composed of at least one of an oxide and a nitride of at least one element selected from the group consisting of Mg, Al, Si, Ti, Cr, Mn, Co, Zr, Ta, W and Hf;

laminating a protective layer on said magnetic layer, and

laminating a liquid lubricant layer on said protective layer.

14. A magnetic recording medium manufactured by a method according to claim 13.

15. A method for manufacturing a magnetic recording medium, comprising the steps of:

laminating a non-magnetic under-layer on a non-magnetic substrate by sputtering in an atmosphere having a partial pressure of H_2O of 2×10^{-10} Torr or below;

laminating a non-magnetic intermediate layer on said non-magnetic under-layer by sputtering in an atmosphere having a partial pressure of H_2O of 2×10^{-10} Torr or below, said non-magnetic intermediate layer being at least one of a metal selected from the group consisting of Ti, Cr, Zr, Hf, Ti alloy, Cr alloy, Zr alloy and Hf alloy;

said non-magnetic intermediate layer having a hexagonal close-packed crystal structure;

said non-magnetic intermediate layer having a thickness of from 0.5 nm to 20 nm;

laminating a magnetic layer on said intermediate layer by sputtering in an atmosphere having a partial pressure of H_2O of 2×10^{-10} Torr or below, said magnetic layer including at least ferromagnetic grains and non-magnetic grain boundaries surrounding said grains, said non-magnetic grain boundaries being composed of at least one of an oxide and a nitride of at least one element selected from the group consisting of Mg, Al, Si, Ti, Cr, Mn, Co, Zr, Ta, W and Hf;

laminating a protective layer on said magnetic layer,

laminating a liquid lubricant layer on said protective layer; and

omitting heating during said steps of laminating.

16. A magnetic recording medium manufactured by a method according to claim 15.